

**What is claimed is:**

1. A replaceable valve seat ring comprising:  
an annular ring body;  
5 an open flow passage extending through the ring body;  
a seating surface on the ring body adjacent to one end of the flow passage; and  
a tool accepting region formed concentric with and at least partially along the  
flow passage, the tool accepting region adapted to receive a standard tool head therein  
for installing and removing the valve seat ring.  
10
2. A replaceable valve seat ring according to claim 1, further comprising  
a flow orifice arranged in series and concentric with the tool accepting region along at  
least a portion of the flow passage.
- 15 3. A replaceable valve seat ring according to claim 2, wherein the flow  
orifice is contoured and sized differently than the tool accepting region to provide  
desired flow characteristics and is arranged downstream of the tool accepting region.
- 20 4. A replaceable valve seat ring according to claim 2, wherein transition  
surfaces extending between the flow orifice and the tool accepting region are  
substantially smooth and gradual to enhance flow efficiency and dynamics.
- 25 5. A replaceable valve seat ring according to claim 1, wherein the tool  
accepting region extends over a substantial portion of a length of the flow passage.

6. A replaceable valve seat ring according to claim 1, wherein the ring body has an exterior perimeter surface and a mechanical engaging feature provided on at least a part of the exterior perimeter surface, the mechanical engaging feature adapted to releaseably engage with a complimentary portion of a valve assembly.

5

7. A replaceable valve seat ring according to claim 6, wherein the exterior perimeter surface is a circular cylinder and wherein the mechanical engaging feature comprises a plurality of mechanical threads.

10

8. A replaceable valve seat ring according to claim 1, wherein the tool accepting region is a generally square cylinder for accepting a standard socket extension within a part of the flow passage.

15

9. A replaceable valve seat ring according to claim 1, further comprising an exterior circular cylinder perimeter surface with a first portion having a first diameter and a necked-down seating portion with a second diameter that is smaller than the first diameter for alining the valve seat ring when installed in a valve.

20

10. A replaceable valve seat ring according to claim 1, wherein transition surfaces extending between the seating surface and the tool accepting region are substantially smooth and gradual to enhance flow efficiency and dynamics.

25

11. A valve assembly comprising:  
a valve body;  
a fluid passageway extending through the valve body and having a fluid inlet and a fluid outlet;  
an orifice region defined within the fluid passageway;

a valve plug disposed within the passageway; and

a replaceable annular valve seat ring positioned in the orifice region, wherein the valve seat ring and the valve plug are movable relative to one another to selectively open or close the flow passage, wherein the valve seat ring has an open flow passage extending therethrough, a seating surface adjacent to one end of the flow passage, and a tool accepting region formed concentric with and at least partially along the flow passage, the tool accepting region adapted to receive a standard tool head therein for installing and removing the valve seat ring.

12. A valve assembly according to claim 11, wherein the valve seat ring is installed in a fixed position within the orifice region and wherein the valve plug is selectively movable into and out of contact with the seating surface of the valve seat ring.

13. A valve assembly according to claim 11, wherein the valve seat ring has an exterior perimeter surface and a mechanical engaging feature provided on at least a part of the exterior perimeter, and wherein a portion of the orifice region includes a complimentary mechanical feature adapted to releaseably engage with the mechanical engaging feature of the valve seat ring surface for securing and aligning the valve seat ring within the orifice region.

14. A valve assembly according to claim 13, wherein the mechanical engaging feature and the complimentary mechanical feature each comprise either male or female mechanical threads.

15. A valve assembly according to claim 11, wherein the tool accepting region is a generally square cylinder for accepting a standard socket extension within a part of the flow passage.

16. A valve assembly according to claim 11, wherein the valve seat ring has an exterior circular cylinder perimeter surface with a first portion having a first diameter and a necked-down seating portion with a second diameter that is smaller than the first diameter, and wherein the orifice region has a complimentary stepped surface.

17. A valve assembly according to claim 11, wherein the valve seat ring also has a flow orifice arranged in series and concentric with the tool accepting region along at least a portion of the flow passage, and wherein the flow orifice is contoured and sized differently than the tool accepting region to provide desired flow characteristics, and wherein transition surfaces extending between the flow orifice and the tool accepting region are substantially smooth and gradual to enhance flow efficiency and dynamics.

18. A method of installing a valve seat within a valve assembly, the method comprising the steps of:

choosing an appropriate valve seat having an annular ring body, an open flow passage extending through the ring body, and a tool accepting region of the flow passage formed concentric with and at least partially along the flow passage;

placing the chosen valve seat into a flow orifice of a valve body of the valve assembly;

selecting a tool with a standard tool head that fits the tool accepting region;

inserting the standard tool head into the tool accepting region of the valve seat; and manipulating the tool to install the valve seat into the orifice region.

19. A method of installing a valve seat according to claim 18, further comprising:

repeating the steps of selecting, inserting, and manipulating in order to remove the valve seat from the valve assembly.

5

20. A method according to claim 18, wherein the step of selecting includes selecting a standard socket extension, and wherein the step of inserting includes inserting the standard socket extension into the tool accepting region.